Space Weather Forecast

Issued on Monday 23 December 2024 at 13:20 Local

This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Further Minor/Moderate radio blackouts likely. Possible glancing CME early on 24 Dec with ongoing elevated solar winds.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been Moderate with four Moderate-class flares observed from the cluster of sunspot regions located in the southeast quadrant.

There are currently eleven sunspot regions on the visible disc, two of which are small and as yet unnumbered. The southeast quadrant remains the focus of solar activity, containing a cluster of the four largest regions. AR3934 in the northeast is also appearing to be a fairly large spot group as it comes more into view. Other remaining regions are relatively small, stable and magnetically simple.

A Coronal Mass Ejection (CME) associated with the recent moderate solar flare will be analysed for an Earth directed component as imagery becomes available. Otherwise a number of other CMEs have been observed in available imagery during the period, but analysis of these suggests none have an Earth directed component.

Solar Wind / Geomagnetic Activity: Elevated to Strong solar wind speeds, averaging around 550km/s, but reached a peak of 794km/s at 22/1817UTC. The Interplanetary Magnetic Field (IMF), Bt, was generally Weak, with the north-south component, Bz, varying weakly throughout. Geomagnetic activity was Quiet to Unsettled (Kp1-3).

Energetic Particles / Solar Radiation: High energy proton flux remained slightly elevated but at sub-Minor Solar radiation storm level.

Four-Day Space Weather Forecast Summary

Solar Activity: Occasional Moderate flares are likely, with a slight chance of isolated Strong flares maintained throughout.

Solar Wind / Geomagnetic Activity: A filament "arc of plasma" lift-off from the northeast disk late in the UTC day 20 Dec was modeled and gives a potential peripheral glance around 24/0000 UTC. No other Earth-directed CMEs appear in the forecast, however the number of CMEs over the past few days means confidence is low.

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Overall, conditions are likely to remain Quiet to Unsettled. Given current Elevated solar wind speeds, there is a chance of Active conditions through the period, tentatively peaking around Days 1 and 2 (23-24 Dec) due to ongoing fast solar wind influence and possible glancing influence from the 20 Dec CME, with a slight chance of G1 Minor Geomagnetic Storms.

Energetic Particles / Solar Radiation: A persistent slight chance of Solar Radiation storms, with current slightly enhanced near-Earth radiation levels expected to ease, but balanced with the increasing threat of enhancement tied to the westward advance of the sunspot cluster located currently in the southeast.

Geomagnetic Storms

Geomagnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	20	20	10	10
Strong	G3	No	1	5	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X-Ray Flares

X-Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 (M Class)	Yes	70	70	70	70
Very Active	R3-R5 (X Class)	No	10	10	10	10

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Solar Radiation Storms (High Energy Protons)

Radiation Storms Probability (Exceedance)	Level ($cm^{-2}sr^{-1}s^{-1}$)	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	**≥ S1**	No	20	20	20	20
Very Active	**≥ S3 ***	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and/or 50 MeV ≥ 10pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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